LISTING OF THE CLAIMS (1-42)

Claim 1 (original): A method of performing back-end manufacturing of an integrated circuit (IC) device comprising:

processing a die-strip through a front-of-line assembly portion which comprises a plurality of sub-stations operating on an in-line basis;

automatically providing said die-strip to an end-of-line assembly portion;

processing said die-strip by said end-of-line assembly portion which comprises a plurality of sub-stations operating on an in-line basis;

automatically providing said die-strip to a test assembly portion;

testing said die-strip using said test assembly portion;

automatically providing said die-strip to a finish assembly portion; and

processing said die-strip by said finish assembly portion which comprises a plurality of sub-stations operating on an in-line basis.

Claim 2 (original): The method as recited in Claim 1 wherein said processing said die-strip by said front-of-line assembly portion comprises:

attaching dies to a strip to produce a die-strip using an in-line die attach sub-station;

curing said die-strip using an in-line cure sub-station;

cleaning said die-strip using an in-line plasma sub-station;

bonding said die-strip using an in-line bond sub-station; and

cleaning said die-strip using a second in-line plasma sub-station.

Claim 3 (original): The method as recited in Claim 2 further comprising employing a camera system for automatic die-strip inspection and quality assurance within said front-of-line assembly portion.

Claim 4 (original): The method as recited in Claim 1 wherein said processing said die-strip by said end-of-line assembly portion comprises:

molding said die-strip using an in-line mold sub-station;

post mold curing said die-strip using an in-line post mold cure sub-station;

attaching said die-strip using an in-line ball attachment sub-station;

sawing said die-strip using an in-line sawing sub-station; and

sorting said sawed die-strip using an in-line sorting sub-station.

Claim 5 (original): The method as recited in Claim 1 wherein said processing said die-strip by said finish assembly portion comprises:

marking die-strip components using an in-line marking sub-station;

performing final visual inspection of said die-strip components using an in-line automated final visual inspection sub-station; and

processing said die-strip components by an in-line tape and reel sub-station.

Claim 6 (original): The method as recited in Claim 2 wherein said front-of-line assembly portion is coupled on an in-line basis with said end-of-line assembly portion and wherein said processing said die-strip by said end-of-line assembly portion comprises:

molding said die-strip using an in-line mold sub-station;

post mold curing said die-strip using an in-line post mold cure sub-station;

attaching said die-strip using an in-line ball attachment sub-station;

sawing said die-strip using an in-line sawing sub-station; and

sorting said sawed die-strip using an in-line sorting sub-station.

Claim 7 (original): The method as recited in Claim 6 wherein said end-of-line assembly portion is coupled on an in-line basis with said finish assembly portion and wherein said processing said die-strip by said finish assembly portion comprises:

marking die-strip components using an in-line marking sub-station;

performing final visual inspection of said die-strip components using an in-line final visual inspection sub-station; and

processing said die-strip components by an in-line tape and reel sub-station.

Claim 8 (original): A method of back-end IC manufacturing comprising:

processing a die-strip through a front-of-line assembly portion which comprises: an in-line die attach sub-station; and an in-line bond sub-station;

automatically providing said die-strip to an end-of-line assembly portion;

processing said die-strip through said end-of-line assembly portion which comprises: an in-line post mold cure sub-station; and an in-line ball attachment sub-station;

automatically providing said die-strip to an in-line test assembly portion;

processing said die-strip by said test assembly portion;

automatically providing said die-strip to a finish assembly portion; and

processing said die-strip through said finish assembly portion which comprises an in-line final visual inspection assembly sub-station.

Claim 9 (original): The method as recited in Claim 8 wherein said front-of-line assembly portion further comprises:

a cure sub-station;

a first plasma sub-station; and

a second plasma sub-station.

Claim 10 (original): The method as recited in Claim 8 wherein said end-of-line assembly portion further comprises:

a mold sub-station;

a sawing sub-station; and

a sorting sub-station.

Claim 11 (original): The method as recited in Claim 10 further comprising employing a camera system for automated die-strip inspection and quality assurance within said end-of-line assembly portion.

Claim 12 (original): The method as recited in Claim 8 wherein said finish assembly portion further comprises:

a marking sub-station; and

a tape and reel sub-station.

Claim 13 (original): The method as recited in Claim 9 wherein said front-of-line assembly portion is coupled in an in-line basis with said end-of-line assembly portion and wherein said end-of-line assembly portion comprises:

a mold sub-station;
a sawing sub-station; and
a sorting sub-station.

Claim 14 (original): The method as recited in Claim 13 wherein said end-of-line assembly portion is coupled in an in-line basis with said finish assembly portion, said finish assembly portion comprising:
a marking sub-station; and
a tape and reel sub-station.

Claim 15 (original): A back-end IC assembly method comprising:
processing a die-strip through a front-of-line portion of an assembly line, wherein said front-of-line assembly portion comprises a plurality of integrated sub-stations which each process said die-strip in an in-line fashion;
processing said die-strip through an end-of-line portion of said assembly line, wherein said end-of-line assembly portion comprises a plurality of integrated sub-stations which each process said die-strip in an in-line fashion; and
using in-line processes, performing test and finish assembly on said die-strip to produce a plurality of taped and reeled IC devices from said die-strip.

Claim 16 (original): A method as described in Claim 15 wherein said front-of-line portion and said end-of-line portion are integrated together and further comprising said front-of-line portion automatically providing said end-of-line portion with said die-strip in an in-line fashion.

Claim 17 (original): A method as described in Claim 16 wherein said processing said die-strip through said front-of-line portion comprises:
curing said die-strip using an in-line cure sub-station; and
cleaning said die-strip using an in-line plasma sub-station.

Claim 18 (original): The method as recited in Claim 17 wherein said processing said die-strip through said front-of-line portion further comprises:
attaching dies to a strip to form a die-strip using a die attach sub-station;
bonding said die-strip using an in-line bond sub-station; and
cleaning said die-strip using a second in-line plasma sub-station.

Claim 19 (original): A method as described in Claim 16 wherein said processing said die-strip through said end-of-line portion comprises:

sawing said die-strip using an in-line sawing sub-station; and

sorting said die-strip using an in-line sorting sub-station.

Claim 20 (original): The method as recited in Claim 19 wherein said processing said die-strip through said end-of-line portion further comprises:

molding said die-strip using an in-line mold sub-station;

performing post mold curing using an in-line post mold cure sub-station; and

performing ball attachment of said die-strip using an in-line ball attachment sub-station.

Claim 21 (original): A method as described in Claim 16 wherein said performing finish assembly comprises:

marking components of said die-strip using an in-line marking sub-station; and

processing said components of said die-strip using an in-line tape and reel sub-station.

Claim 22 (original): The method as recited in Claim 21 wherein said performing finish assembly further comprises performing an automated final visual inspection using an in-line visual inspection sub-station.

Claim 23 (original): The method as recited in Claim 22 wherein said performing finish assembly further comprises employing a camera system for automated die-strip inspection and quality assurance.

Claim 24 (original): A method as described in Claim 16 wherein said performing test uses an in-line test portion of said assembly line and wherein said in-line test portion and said end-of-line portion are integrated together and further comprising said end-of-line portion automatically providing said test portion with said die-strip in an in-line fashion.

Claim 25 (original): A method as described in Claim 23 wherein said performing finish assembly uses an in-line finish portion of said assembly line and wherein said in-line finish portion and said test portion are integrated together and further comprising said test

portion automatically providing said finish portion with said die-strip in an in-line fashion.

Claim 26 (original): An automated process for assembling, packaging, finishing and/or testing integrated circuits, comprising the steps of:

(a) attaching a plurality of integrated circuit die to a substrate in a die attach module under computer control;

(b) inspecting the substrate and attached die with a first automated machine vision system;

(c) automatically transporting the inspected attached die to a wire bonding module;

(d) bonding wires to both the substrate and the attached die in the wire bonding module under computer control;

(e) inspecting the wire-bonded die and substrate with a second automated machine vision system, the second automated machine vision system being independent from or in electronic communication with the first automated machine vision system;

(f) automatically transporting the inspected wire-bonded die and substrate to a molding module;

(g) encapsulating the inspected wire-bonded die and substrate with a mold material in the molding module under computer control;

(h) inspecting the encapsulated die and substrate with a third automated machine vision system, the third automated machine vision system being independent from or in electronic communication with the first and/or second automated machine vision system(s);

(i) automatically transporting the inspected encapsulated die and substrate to a singulation module;

(j) separating the inspected encapsulated die and substrate into separated die in the singulation module under computer control;

(k) inspecting the separated die with a fourth automated machine vision system, the fourth automated machine vision system being independent from or in electronic communication with the first, second and/or third automated machine vision system(s);

(l) automatically transporting the inspected separated die to a testing module; and

(m) testing the inspected separated die in the testing module under computer control.

Claim 27 (original): The automated process of claim 26, further comprising the step of:

automatically transporting the tested die to a marking module; and

marking the tested die in the marking module under computer control.

Claim 28 (original): The automated process of claim 27, further comprising the step of:

inspecting the marked die with a fifth automated machine vision system, the fifth automated machine vision system being independent from or in electronic communication with the first, second, third and/or fourth automated machine vision system(s).

Claim 29 (original): The automated process of claim 26, further comprising the step of:

automatically transporting the tested die to a packaging module; and

packaging the tested die in the packaging module under computer control.

Claim 30 (original): The automated process of claim 29, further comprising the step of:

inspecting the packaged die with a sixth automated machine vision system, the sixth automated machine vision system being independent from or in electronic communication with the first, second, third and/or fourth automated machine vision system(s).

Claim 31 (original): The automated process of claim 29, wherein the packaging module comprises a tape and reel module.

Claim 32 (original): The automated process of claim 26, further comprising the step of:

snap curing the attached die prior to the step of automatically transporting the inspected attached die to the wire bonding module.

Claim 33 (original): The automated process of claim 26, further comprising the step of:

plasma cleaning the attached die prior to the step of automatically transporting the inspected attached die to the wire bonding module.

Claim 34 (original): The automated process of claim 26, further comprising the step of:

plasma cleaning the wire-bonded die prior to the step of automatically transporting the inspected wire-bonded die to the molding module.

Claim 35 (original): The automated process of claim 26, wherein the singulation module comprises a sawing module.

Claim 36 (original): The automated process of claim 26, wherein the substrate comprises an n-by-m matrix array ball grid array type substrate, n and m each independently being an integer of at least 2.

Claim 37 (original): The automated process of claim 26, further comprising the step of:

automatically loading wafers into a sawing module; and

sawing said wafers under computer control to provide said plurality of integrated circuit die.

Claim 38 (original): An automated process, comprising the steps of:

(a) attaching a plurality of integrated circuit die to a substrate in a die attach module under computer control;

(b) inspecting the attached die with a first automated machine vision system;

(c) automatically transporting the inspected attached die to a molding module;

(d) encapsulating the attached die with a mold material in the molding module under computer control;

(e) inspecting the encapsulated die with a second automated machine vision system, the second automated machine vision system being independent from or in electronic communication with the first automated machine vision system;

(f) automatically transporting the inspected molded die to a testing module; and

(g) testing the inspected separated die in the testing module under computer control.

Claim 39 (original): An automated process, comprising the steps of:

(a) attaching a plurality of integrated circuit die to a substrate in a die attach module under computer control;

(b) inspecting the attached die with a first automated machine vision system;

(c) automatically transporting the inspected attached die to a wire bonding module;

(d) bonding wires to both the substrate and the die in the wire bonding module under computer control;

(e) inspecting the wire-bonded die with a second automated machine vision system, the second automated machine vision system being independent from or in electronic communication with the first automated machine vision system;

(f) automatically transporting the inspected wire-bonded die to a molding module;

(g) encapsulating the inspected wire-bonded die with a mold material in the molding module under computer control.

Claim 40 (original): An automated process, comprising the steps of:

(a) bonding wires to both a substrate and a plurality of die attached to said substrate in a wire bonding module under computer control;

(b) inspecting the wire-bonded die and substrate with a first automated machine vision system;

(c) automatically transporting the inspected wire-bonded die and substrate to a molding module;

(d) encapsulating the inspected wire-bonded die and substrate with a mold material in the molding module under computer control;

(e) inspecting the encapsulated die with a second automated machine vision system, the second automated machine vision system being independent from or in electronic communication with the first automated machine vision system(s);

(f) automatically transporting the inspected encapsulated die and substrate to a singulation module;

(g) separating the inspected encapsulated die and substrate in the singulation module under computer control.

Claim 41 (original): An automated process, comprising the steps of:

(a) bonding wires to both a substrate and a plurality of die attached to said substrate in a wire bonding module under computer control;

(b) inspecting the wire-bonded die and substrate with a first automated machine vision system;

(c) automatically transporting the inspected wire-bonded die and substrate to a molding module;

(d) encapsulating the inspected wire-bonded die and substrate with a mold material in the molding module under computer control;

(e) inspecting the encapsulated die and substrate with a second automated machine vision system, the second automated machine vision system being independent from or in electronic communication with the first automated machine vision system(s);

(f) automatically transporting the inspected encapsulated die and substrate to a testing module; and

(g) testing the inspected encapsulated die and substrate in the testing module under computer control.

Claim 42 (original): An automated process, comprising the steps of:

(a) encapsulating a substrate, a plurality of die attached to said substrate, and a plurality of wires bonded between each die and said substrate with a mold material in a molding module under computer control;

(b) inspecting the encapsulated substrate, die and wires with a first automated machine vision system;

(c) automatically transporting the inspected encapsulated substrate, die and wires to a singulation module;

(d) separating the inspected encapsulated substrate, die and wires in the singulation module under computer control to provide separated die;

(e) inspecting the separated die with a second automated machine vision system, the second automated machine vision system being independent from or in electronic communication with the first automated machine vision system(s);

(f) automatically transporting the inspected separated die to a testing module; and

(g) testing the inspected separated die in the testing module under computer control.